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GENERAL

ATOMIC POWER

3248 CF-56-1-162

Oak Ridge National Lab., Tenn.

PROCESSING REQUIREMENTS, BUILDUP OF FISSION PRODUCT ACTIVITY, AND LIQUID RADIOCHEMICAL WASTE VOLUMES IN A PREDICTED NUCLEAR POWER ECONOMY. H. R. Zeitlin, E. D. Arnold, and J. W.

Ullmann. Jan. 30, 1956. 18p. Contract [W-7405-Eng-26] \$3.30(ph OTS); \$2.40(mf OTS).

3249 WIAP-M-18

[Westinghouse Electric Corp.] Industrial Atomic Power [Group], Pittsburgh.

PERMISSIBLE FUEL COSTS WITH REPROCESSING.

J. M. Stein. May 20, 1953. 4p. \$1.80(mf OTS).

Factors influencing the cost of nuclear fuel are listed. A maximum permissible reprocessing cost which allows competition with fossil fuels is calculated. The basis for the calculations is 40 cents per million BTU. (D.E.B.)

BIOLOGY AND MEDICINE

RADIATION EFFECTS

3250 AECU-3169

Brown Univ., Providence.

PENETRATION OF THE GUT WALL BY INTESTINAL BACTERIA AFTER X-IRRADIATION. Progress Report for June 1, 1955 to January 31, 1956. M. H. Hatch. 9p. Contract AT(30-1)-1815. \$1.80(ph OTS); \$1.80(mf OTS).

Factors affecting bacterial invasion from the intestinal tract in x irradiated mice were investigated. *P. morganii* was administered in the drinking water on the seventh day following exposure to 600 r total-body x irradiation. Mortality increased from about 40% following irradiation alone to about 62% after radiation and bacterial challenge together. No effect on mortality was produced by immunization with *P. morganii* prior to irradiation or injection of spleen homogenates from normal mice shortly after irradiation. (C.H.)

3251 BNL-2450

Brookhaven National Lab., Upton, N. Y.

THE PRESENCE OF ENLARGED PITUITARY GLANDS IN RATS FOLLOWING ADMINISTRATION OF I^{131} . C. J. Shellabarger and J. T. Godwin. [1955]. 5p. \$1.80(ph OTS); \$1.80(mf OTS).

3252 MLM-976

Mound Lab., Miamisburg, Ohio.

THE EFFECTS OF CELL DIVISION INHIBITION ON PHOSPHORUS METABOLISM OF *ESCHERICHIA COLI*. B. J. Katchman, E. S. Spoerl, and H. E. Smith. May 24, 1954. 10p. Contract AT-33-1-gen-53. \$1.80(ph OTS); \$1.80(mf OTS).

The effects of cell division inhibition on P metabolism of *Escherichia coli* due to treatment by radiation and certain organic compounds are reported. Filamentous cell forms are produced by treating the cells with the radiations and compounds cited. A method for partitioning and analyzing phosphorus compounds of normal and filamentous forms of *Escherichia coli* is described. Comparison between both types of cells shows no change in intracellular phosphorus content, except for some variation in those cells exposed to α radiation. (auth)

3253 UR-433

Rochester, N. Y. Univ. Atomic Energy Project.

SOME EFFECTS OF SUPERIMPOSING TWO RADIANT ENERGY THERMAL BURNS ON BARE PORCINE SKIN. J. R. Hinshaw. Feb. 17, 1956. 38p. Contract W-7401-eng-49. \$6.30(ph OTS); \$3.00(mf OTS).

The effects of two superimposed radiant thermal energy exposures are synergistic but not additive, and the results are somewhat dependent on the time interval between exposures. A mild burn offers no protection from a more severe burn, but a moderately severe burn occasionally protects against a very severe exposure. Factors associated with the initial exposure which are involved in the final effect include temperature of the tissue; latent, reversible injury of tissue; and changes in the thermal properties of skin. (auth)

RADIATION HAZARDS AND PROTECTION

3254 AECD-3728

North American Aviation, Inc., Downey, Calif.

SAFETY ANALYSIS OF THE STORAGE AND HANDLING OF THE SRE FUEL. R. O. Williams. Nov. 17, 1954. Decl. Nov. 9, 1955. 8p. Contract [AT(11-1)-GEN-8]. (NAA-SR-Memo-1104). \$1.80(ph OTS); \$1.80(mf OTS).

3255 UR-434

Rochester, N. Y. Univ. Atomic Energy Project.

THE USE OF VITAMIN FORTIFIED ANTIBIOTICS IN THE THERAPY OF THE ACUTE RADIATION SYNDROME IN DOGS. Sol M. Michaelson, Joe W. Howland, Janet M. Koszalka, Donald J. DeBottis, and Andrew Konnerth. Feb. 29, 1956. 29p. Contract W-7401-eng-49. \$4.80(ph OTS); \$2.70(mf OTS).

The supplementation of a broad spectrum antibiotic with vitamins and other nutritional factors was found to enhance the increase in survival of the irradiated animal over that obtained from the use of the antibiotic therapy alone. (auth)

RADIOTHERAPY

3256 TID-8007

Technical Information Service, AEC.

TELETHERAPY DEVICES WITH RADIOACTIVE ISOTOPES. Marshall Brucer, Oak Ridge Inst. of Nuclear Studies. Mar. 1956. 11p.

One of its monograph series "The Industrial Atom." Design features of teletherapy devices using radio-

isotopes as γ radiation sources are discussed. The characteristics of various teletherapy machines in use at the present time which employ Co^{60} as a radiation source are reviewed. Advantages of Cs^{137} as a teletherapy source are discussed. Other possible sources discussed include $\text{Eu}^{152,154}$, Eu^{155} , and Ce^{144} . (C.H.)

TOXICOLOGY STUDIES

3257 UR-416

Rochester, N. Y. Univ. Atomic Energy Project. BERYLLIUM GRANULOMATA IN THE SKIN OF THE PIG. W. L. Downs, R. D. Armstrong, E. A. Maynard, R. B. Coye, Jr., J. K. Scott, H. C. Hodge, and R. C. Kesel. Dec. 5, 1955. 16p. Contract W-7401-Eng-49. \$3.30(ph OTS); \$2.40(mf OTS).

The implantation of phosphor powders containing beryllium oxide in the skin of the Chester-White pig and in the Hormel miniature pig resulted in the production of a granulomatous lesion within 2 mo. after implantation. The implantation in the skin of the pig of ferric oxide, activated carbon, quartz crystals, and beryllium oxide produced non-specific mononuclear reactions that appeared to heal with time. (auth)

3258 UR-427

Rochester, N. Y. Univ. Atomic Energy Project. POSSIBLE SEX INFLUENCES ON THE METABOLISM OF POLONIUM²¹⁰ IN THE RAT. J. N. Stannard and M. A. K. Angell. Jan. 30, 1956. 19p. Contract W-7401-eng-49. \$3.30(ph OTS); \$2.40(mf OTS).

3259 UR-429

Rochester, N. Y. Univ. Atomic Energy Project. THE EFFECT OF BAL (BRITISH ANTI-LEWISITE) ON DISTRIBUTION AND EXCRETION OF ORALLY ADMINISTERED POLONIUM²¹⁰. J. N. Stannard and Helen Haydon. Feb. 20, 1956. Contract W-7401-Eng-49. \$3.30(ph OTS); \$2.40(mf OTS).

The effectiveness of intramuscular British Anti-Lewisite in influencing the metabolism of orally administered Po has been determined in the rat. In contrast to its effects on Po administered intravenously, BAL did not promote excretion of the metal in either urine of feces, did not reduce retention, and did not reduce the relative amounts of Po deposited in radiosensitive tissues. Instead, BAL facilitated absorption from the gastrointestinal tract, reduced fecal excretion, and increased retention. While relative toxicity was not determined in these experiments, it would not be predicted that BAL would materially reduce the effects of a given body burden received by the oral route. This again contrasts with the clearly reduced toxicity of intravenously administered Po when BAL treatment is given. It is thought that these contrasts reside in differences in the chemical form of Po in the body. In view of current trends toward adding chelating agents to food products, it is suggested that the effects of such agents on gastrointestinal absorption of trace metals be investigated. (auth)

3260 UR-431

Rochester, N. Y. Univ. Atomic Energy Project. THE ACUTE TOXICITY AND RETENTION OF INTRATRACHEALLY ADMINISTERED POLONIUM²¹⁰ IN THE RAT. R. J. Della Rosa. Mar. 5, 1956. 10p. Contract W-7401-eng-49. \$1.80(ph OTS); \$1.80(mf OTS).

The acute toxicity of intratracheally administered Po^{210}

in the rat has been studied. It is concluded that there is no marked difference in the toxicity of Po after intratracheal intubation as compared with equivalent body burdens attained by gavage or intravenous administration. This occurs despite differences in tissue distribution and in the kinetics of excretion, and indicates that acute radiation death from Po may be dependent more upon the total amount of energy released within the body than its site of concentration. (auth)

3261 AEC-tr-2400

INVESTIGATION INTO THE RELATION BETWEEN THE BODY AND THE REPRODUCTIVE ORGANS. VI. THE EFFECT OF CAFFEIN ON THE REPRODUCTION OF THE RUSSIAN RABBIT. H. Stieve. Translated from *Z. mikroskop. anat. Forsch.* 15, 599-652(1928). 63p.

Caffeine was found to severely damage both the male and female reproductive organs in the Russian rabbit. Embryos *in utero* were also damaged even when the caffeine was given in amounts which caused no pathological changes in the body as a whole of the parent animal. (C.H.)

CHEMISTRY

3262 BM-RI-5214

Bureau of Mines. ZIRCONIUM PURIFICATION, USING A BASIC SULFATE PRECIPITATION. R. H. Nielsen and R. L. Govro. Mar. 1956. 16p.

The work upon which this report is based was done under Contract AT(11-1)-140 between the Bureau of Mines and the AEC.

The basic zirconium sulfate precipitation process produces a sufficiently pure zirconium oxide with negligible loss of zirconium. The following optimum conditions and procedure for the precipitation were established in laboratory tests and used in plant operation: the zirconyl chloride solution is mixed with sulfuric acid to obtain a molecular ratio of zirconium to sulfur of 5:2. The mixed solution is heated above 90°C and diluted to 0.2 pound of zirconium per gallon with hot water; then the solution pH is adjusted to 1.4 with ammonium hydroxide. (auth)

3263 AEC-tr-2401

THE LINKAGE OF WATER IN HYDRATES OF MANGANESE DIOXIDE, TITANIUM DIOXIDE AND THORIUM DIOXIDE. Oscar Glemser. Translated from *Z. Elektrochem.* 45, 820-826; 826-9(1939). 16p.

A dielectric method for the determination of the linkage of water in the hydrates of MnO_2 , TiO_2 , and ThO_2 is presented. (J.E.D.)

3264 AEC-tr-2420

SEMICONDUCTOR PROPERTIES OF CUPROUS OXIDE. I. METHOD OF PREPARATION WITH CONSIDERATION OF STABILITY CONDITIONS. G. Blankenburg and K. Kassel. Translated from *Ann. Physik* 10, 201-10(1952). Available from Associated Technical Services (Trans. No. 41H9G), East Orange, N. J. 10p.

A method is described to prepare Cu_2O by oxidation of solid Cu. In the course of this preparation it was necessary to choose conditions meeting the requirement that the material would correspond to a well defined substance. The results of microscopic examinations about presumed inclusions of Cu or CuO within the Cu_2O crystals are discussed. (auth)

3265 AEC-tr-2427

THE INFLUENCE OF INTENSITY AND FREQUENCY OF ULTRASONIC WAVES ON THE GRAIN SIZE OF CALCIUM CARBONATE PRECIPITATE. Ryoukichi Okazaki. Translated from *Ôyô Butsuri* 22, 358-9(1953). 4p.

ANALYTICAL PROCEDURES**3266** CF-56-1-130

Oak Ridge National Lab., Tenn.

RADIOISOTOPE ASSAY METHODS AT OAK RIDGE

NATIONAL LABORATORY. S. A. Reynolds, W. S. Lyon, and E. I. Wyatt. Jan. 25, 1956. 8p. Contract W-7405-eng-26. \$1.80(ph OTS); \$1.80(mf OTS).

Analytical procedures used at ORNL for the calibration and routine measurement of radioisotope shipments are tabulated. Estimates of the accuracy of disintegration rate determinations, and the precision of measurements are furnished. Modes of decay and "best" values of half lives are included. (C.W.H.)

3267 LA-1721(Rev.)

Los Alamos Scientific Lab., N. Mex.

COLLECTED RADIOCHEMICAL PROCEDURES. D. P.

Ames, J. W. Barnes, N. A. Bonner, W. H. Burgus, G. A. Cowan, P. B. Elkin, G. P. Ford, J. S. Gilmore, E. J. Lang, M. A. Melnick, C. O. Minkinen, H. A. Potratz, R. J. Prestwood, J. E. Sattizahn, T. T. Shull, C. W. Stanley, — Jacob Kleinberg, comp. Sept. 10, 1954. Revised Nov. 18, 1955. 287p. Contract W-7405-eng-36. (Deleted version: AECD-3674). \$1.50(OTS).

This report supersedes LA-1566, LA-1721, LA-1722, and LA-1587.

The dependency of chemical properties on electronic configuration is discussed. Procedures are presented for the separation from fission products and determination of Be, Na, P, Cl₂, Ca, Sc, Cr, Fe, Co, Ni, Ge, As, Rb, Y, Zr, Nb, Mo, Ru, Pd, Ag, Cd, In, Sn, Sb, Cs, Ba, Ce, Eu, Ta, W, Au, Tl, Th²³⁰, Th, Th²³⁴, Pa, U²³⁵, U²³⁷, U, Np, Am, and Cm. (C.W.H.)

3268 ORNL-2059

Oak Ridge National Lab., Tenn.

DETERMINATION OF DISSOLVED OXYGEN IN LUBRICATING FLUIDS. J. C. White, A. S. Meyer, Jr., and B. L. McDowell. Mar. 27, 1956. 9p. Contract W-7405-eng-26. \$1.80(ph OTS); \$1.80(mf OTS).

The volume of dissolved or entrained oxygen in some lubricating fluids was determined by displacing the insoluble gases in the fluids with carbon dioxide, following which, the oxygen in the insoluble gases was absorbed in potassium pyrogallate. The oxygen content for the lubricants under consideration ranged from a maximum of 42 µg per ml. The coefficient of variation of this method was about 7%. (auth)

3269 AEC-tr-2430**DIRECT POTENTIOMETRIC TITRATION OF FLUORIDES.**

M. M. Raines, O. I. Perogova, and M. V. Andreeva. Translated by R. R. Kepple from *Zavodskaya Lab.* 21, 152-4(1955). 3p.

FLUORINE AND FLUORINE COMPOUNDS**3270** AECU-3162

Cornell Univ., Ithaca, N. Y.

INTERMOLECULAR BINDING IN THE SOLID HALOGENS.

R. Bersohn. [1955?]. 11p. Contract AT(30-1)-1662. \$3.30(ph OTS); \$2.40(mf OTS).

The valence theories of halogen coupling constants in the solid state are reviewed. Molecular properties of solid I₂, Br₂, and Cl₂ are tabulated. (C.W.H.)

3271 NYO-7597

George Washington Univ., Washington, D. C.

FINAL REPORT FOR 1955. I. THE FLUOROPLATINATES.

II. TETRAVALENT PRASEODYMIUM. Theodore Perros. Jan. 1956. 4p. Contract AT(30-1)-821. \$1.80(ph OTS); \$1.80(mf OTS).

The preparation and physical properties (density and solubility) of magnesium and alkaline-earth fluoplatinates are described. Attempts were made to prepare tetravalent praseodymium fluoride. (C.W.H.)

Refer also to abstract 3269.

RADIATION CHEMISTRY**3272** UCRL-3317

California. Univ., Berkeley. Radiation Lab.

THE RADIOLYSIS PRODUCTS FROM ETHYL ALCOHOL;**EFFECT OF TOTAL ENERGY INPUT ON THE RADIOLYSIS PRODUCTS.**

Amos S. Newton and W. R. McDonell. Feb. 21, 1956. 9p. Contract W-7405-eng-48. \$0.15(OTS).

Data are presented on the effect of increasing bombardment on the yields of some products formed in the helium ion irradiation of liquid C₂H₅OH. The energy input was varied from 0.029 to 2.7 × 10²² ev/ml. Hydrogen, total carbonyl products, and vicinal glycols decrease markedly with increasing bombardment. The addition of acetaldehyde or hexene-1 causes a marked decrease in the yield of H₂ but smaller changes in other products. The results are discussed in terms of mechanisms involving charge or excitation exchange and radical traps. (auth)

RARE EARTHS AND RARE-EARTH COMPOUNDS

Refer to abstracts 3267 and 3271.

SEPARATION PROCEDURES**3273** WIN-2

National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass.

FLOTATION AND LEACHING OF PRODUCTS FROM HIGH

LIME UTEX ORES. D. R. George and Robert A. Eisenhauer. Dec. 31, 1954. Decl. Sept. 19, 1955. 45p. Contract AT(49-6)-924. \$0.30(OTS).

Test data are presented on the flotation of calcite from high lime Utex ores and on leaching of the products with H₂SO₄ or Na₂CO₃ solutions. (auth)

3274 Y-560

Oak Ridge National Lab., Y-12 Area, Tenn.

PREPARATION OF PURE ZIRCONIUM OXIDE; LABORATORY STUDIES.

W. R. Grimes, C. J. Barton, Sr., L. G. Overholser, J. P. Blakely, and J. D. Redman. Feb. 7, 1950. Decl. Nov. 18, 1955. 65p. Contract W-7405-eng-26. \$0.40(OTS).

Laboratory studies leading to large-scale production of hafnium-free ZrO₂ of high purity are described. A review of recent improvements in the thiocyanate extraction

process for Hf extraction is included along with a discussion of various purification processes, largely based on organic precipitants, which have been attempted. (auth)

TRANSURANIC ELEMENTS AND COMPOUNDS

3275 HW-41025

Hanford Atomic Products Operation, Richland, Wash.
ELECTRODEPOSITION OF THE ACTINIDE ELEMENTS.
R. Ko. Jan. 23, 1956. 10p. Contract W-31-109-Eng-52.
\$1.80(ph OTS); \$1.80(mf OTS).

Thorium, U, Np, Pu, Am, and Cr have been deposited at metal cathodes by the electrolytic formation of base. The electrolyses have been made in various acid solutions containing ammonium formate. The presence of formate reduces hydrogen ion formation at the anode and makes the quantitative precipitation of the metal hydroxides at the cathode possible. (auth)

URANIUM AND URANIUM COMPOUNDS

3276 NYO-3921

Tufts Univ., Medford, Mass.
HIGH TEMPERATURE AND HIGH PRESSURE X-RAY STUDIES OF URANIUM HYDRIDE. Progress Report [for] March 17, 1955 to October 17, 1955. Edward J. Goon and T[homas] R. P. Gibb, Jr. Oct. 17, 1955. Decl. Jan. 13, 1956. 16p. Contract AT(30-1)-1355.

The high-temperature high-pressure X-ray-diffraction device was used to study the uranium-hydrogen system at 400, 450 and 500°C. When hydrogen is removed from UH_3 at elevated temperature by decreasing the pressure, two phases are observed within a narrow range of pressures, presumably corresponding to the pressure limits of the sloping regions observed for the isotherms of this system. The structural ordering of hydride prepared from α -uranium powder at room temperature is discussed. The lattice parameter of UH_3 is given for temperatures up to 500°C. (auth)

3277 RMO-2531

Rohm and Haas Co. Research Labs., Philadelphia.
APPLICATION OF THE ION EXCHANGE SEPARATION OF URANIUM TO THE ANALYSIS OF ORES. Sallie A. Fisher. Aug. 12, 1954. Decl. Sept. 23, 1955. 14p. Contract AT(49-1)-535. \$0.15(OTS).

The analytical separation of U from interfering elements by ion exchange using Amberlite IRA-400 was extended to include ores as well as solutions. Samples were analyzed in 4 hr using a H_2SO_4 - MnO_2 opening technique followed by ion exchange separation and colorimetric estimation of the U. (auth)

Refer also to abstracts 3267 and 3275.

ENGINEERING

HEAT TRANSFER AND FLUID FLOW

Refer to abstract 3294.

MATERIALS TESTING

3278 Y-589

Oak Ridge National Lab., Y-12 Area, Tenn.
CORROSION STUDY FOR A CHEMICAL PROCESSING PLANT. PARTS I AND II. Frank A. Knox. Aug. 17, 1950. Decl. Nov. 18, 1955. 30p. Contract W-7405-eng-26.

An investigation was made of the corrosion-resistant properties of various materials of construction for a chemical processing plant for the production of Hf-free Zr using several corrosive solutions. To date, metals, plastics, packing materials, and protective coatings were tested against hexone, thiocyanic acid, HCl, and H_2SO_4 in various mixtures and the results are reported. (auth)

PUMPS

3279 CF-56-2-90

Oak Ridge National Lab., Tenn.
A PROMISING GASKET FOR 150C, 200A, 400A AND SIMILAR WESTINGHOUSE CANNED ROTOR PUMPS. R. N. Lyon and W. Q. Hullings. Feb. 3, 1956. 4p. Contract [W-7405-eng-26]. \$1.80(ph OTS); \$1.80(mf OTS).

A special gasket of stainless steel has been designed which insures a seal and permits thermal cycling without danger of flange leakage. (auth)

MINERALOGY, METALLURGY, AND CERAMICS

CORROSION

3280 AECU-3167

Case Inst. of Tech., Cleveland.
HIGH TEMPERATURE SCALING BEHAVIOR OF ZIRCONIUM. Technical Progress Report No. 2. H. M. Green, E. B. Evans, and W. M. Baldwin, Jr. Dec. 1955. 17p. Contract AT(11-1)-258. \$3.30(ph OTS); \$2.40(mf OTS).

3281 AECU-3168

Case Inst. of Tech., Cleveland.
SCALING OF ZIRCONIUM AT ELEVATED TEMPERATURES. Quarterly Status Report No. 11 [for] December 2, 1955 to March 2, 1956. C. A. Barrett, E. B. Evans, and W. M. Baldwin, Jr. Mar. 13, 1956. 7p. Contract AT(11-1)-258. \$1.80(ph OTS); \$1.80(mf OTS).

3282 ORNL-2048

Oak Ridge National Lab., Tenn.
CORROSION OF MATERIALS IN FUSED HYDROXIDES. G. P. Smith. Mar. 27, 1956. 31p. Contract W-7405-eng-26. \$6.30(ph OTS); \$3.00(mf OTS).

The corrosion of ceramics and ceramic-related substances by fused hydroxides occurs both by solution and by chemical reaction. A few ceramics react with hydroxides by oxidation-reduction reactions, but most have been found to be attacked by oxide-ion donor-acceptor reactions. Magnesium oxide was the most corrosion-resistant of the ceramics which have been tested, although several other ceramics are sufficiently resistant to be useful. The corrosion of metals and alloys by fused hydroxides takes place primarily by oxidation of the metal, accompanied by

reduction of hydroxyl ions to form hydrogen and oxide ions. Three side reactions are known, but two of them are not important in most corrosion tests. The corrosion of alloys involves either the formation of subsurface voids within the alloy or the formation of complex, two-phase corrosion products at the surface of the alloy. Nickel is the most corrosion-resistant metal which has been studied in fused sodium hydroxide. Mass transfer, induced by temperature differentials, has been found to be the primary factor limiting the use of metals which, under suitable conditions, do not corrode seriously. (auth)

GEOLOGY AND MINERALOGY

3283 TID-3053

Technical Information Service, AEC.

EXPLORATION FOR AND INVESTIGATIONS OF MINERALS OF INTEREST TO THE U. S. ATOMIC ENERGY COMMISSION PROGRAM. A Bibliography of Unclassified Report Literature. Lore Rose David and Robert L. Morgan, comps. July 1954. 52p.

This annotated bibliography of 241 items includes unclassified report literature issued under the program for raw materials exploration by or under contract with the U. S. Manhattan District Engineers and the U. S. Atomic Energy Commission up to June 30, 1952. For completeness, unclassified literature on the subject issued by other agencies and in the files of the Technical Information Extension, AEC, has been included. (auth)

METALS AND METALLURGY

3284 BM-RI-5200

Bureau of Mines.

HOMOGENEOUS ALLOY INGOTS PRODUCED BY CONSUMABLE-ELECTRODE ARC MELTING. R. A. Beall, F. Caputo, and E. T. Hayes. Mar. 1956. 14p.

Homogeneous zirconium alloy ingots meeting exacting specifications were prepared by consumable-electrode arc melting in a water-cooled copper crucible. Bars pressed from zirconium sponge metal were melted in a semicontinuous fashion, and the alloying ingredients were added periodically as the melting progressed. Stirring the melt with a magnetic field improved ingot homogeneity. Double melting was found to be a necessity to remove gas and distribute the alloy. A number of unsuccessful techniques for adding alloying elements by incorporating tin wire in the pressed bars and auxiliary feeding of chopped tin wire are discussed. (auth)

3285 NYO-7054

Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy.

THE STRUCTURE OF SOLID SOLUTIONS. Technical Report No. 32. B. L. Averbach. Nov. 1, 1955. 37p. Contract AT(30-1)-1002, Scope II. \$0.30(OTS).

Theory and experimental data for the estimation of atomic sizes in solid solutions are reviewed. The effects of strain energy on thermodynamic properties of solid solutions are discussed. (C.W.H.)

3286 SO-2045

General Electric Co. Research Lab., Schenectady, N. Y. FUNDAMENTAL RESEARCH IN PHYSICAL METALLURGY. Twenty-ninth Quarterly Report. (Progress Re-

port No. 46). W. DeSorbo, R. E. Hoffman, R. A. Oriani, and D. Turnbull. Apr. 5, 1956. 7p. Contract W-31-109-Eng-52. (56-RL-1521). \$1.80(ph OTS); \$1.80(mf OTS).

Additional results have been obtained on the effect of dissolved impurities on the grain boundary self-diffusion coefficient D_B in silver. One percent Ge additions cause D_B to decrease by about 30%, but the activation energy is not significantly affected. The heat capacity of graphite, containing a small amount of boron, has been measured for the temperature range 1 to 4°K. The boron addition had no significant effect on the coefficient of the linear temperature term in the heat capacity equation. (auth)

3287 UCRL-4629

California, Univ., Livermore. Radiation Lab.

RELATIONSHIPS BETWEEN APPLIED PRESSURE, DENSITY, AND LENGTH IN PRESSED COMPACTS. Barney Rubin. Dec. 15, 1955. 12p. Contract W-7405-eng-48. \$0.15(OTS).

Equations have been derived for expressing the variations with length of true and average densities of a diepressed compact. For any given set of pressing conditions and materials whose parameters can be determined, these expressions permit calculation of the variation of density within such compacts as functions of pressure, compact area, compact perimeter, and compact length. (auth)

Refer also to abstract 3274.

PHYSICS

3288 AECD-3734

Sandia Corp., Albuquerque, N. Mex.

OZONOSPHERE OBSERVATIONS FROM PROPAGATION OF ATOMIC BLAST WAVES. Jack W. Reed. Oct. 1, 1954. Decl. Feb. 17, 1956. 20p. \$4.80(ph OTS); \$2.70(mf OTS).

Observations of refracted sound waves from atomic tests at the Nevada and Pacific Proving Grounds are evaluated to show temperature and winds in the ozonosphere. A simplified method of making these interpretations is presented to reduce the computation work load normally associated with atmospheric sound studies. (auth)

3289 ANL-5512

Argonne National Lab., Lemont, Ill.

LIGHT TRANSMITTANCE AS A MEASURE OF INTERFACIAL AREA IN LIQUID-LIQUID DISPERSIONS. Virgil G. Trice, Jr. and Walton A. Rodger. Jan. 1956. 44p. Contract W-31-109-eng-38. \$0.30(OTS).

Measurement of the interfacial area in liquid-liquid systems has been made photographically. The precision and accuracy of the method have been shown to be better than 10%. To avoid the tedium of counting drops, a simple light probe of an easily reproducible design has been developed to measure light transmission through the dispersions formed. Correlations of light transmission with interfacial area are presented and their usefulness and limitations discussed. (auth)

3290 RFP-55

Dow Chemical Co. Rocky Flats Plant, Denver.

THE OPTICAL PROPERTIES OF TEN METAL CUPPER-RATES. W. S. Turnley. Dec. 1955. 18p. Contract AT(29-1)-1106. \$0.20(OTS).

The optical properties of barium, cadmium, calcium, copper, iron, lead, manganese, strontium, uranium, and zinc cupferrates are given. X-ray data for uranyl ammonium cupferrate is included. (auth)

CRYSTALLOGRAPHY AND CRYSTAL STRUCTURE

3291 AECU-3158

California Inst. of Tech., Pasadena. Norman Bridge Lab. of Physics.

A METHOD FOR MONOCHROMATIZATION AND PRECISE POINT FOCUSING OF X-RAYS AND ITS APPLICATION IN LOW ANGLE DIFFRACTION STUDIES. Special Technical Report No. 13. Dwight Winton Berreman. Apr. 1955. 98p. Contract AT(04-3)-63. \$15.30(ph OTS); \$5.40(mf OTS).

A principle for bending crystals with a minimum of strain so that they will focus x rays and γ rays accurately to a point is explained. Detailed calculations are made of the aberrations in the foci resulting from various applications of the principle. The application of the principle in making a point focusing monochromator for low angle x-ray diffraction studies is discussed, and theoretical and experimental determinations of the reflection coefficient of the crystal are compared. A few experiments in low angle diffraction from biological materials using the new monochromator are described, and the results are compared with those obtained using other instruments. (auth)

GASES

3292 COO-1015

Illinois. Univ., Urbana. Engineering Experiment Station. PRINCIPLES AND PROCESSES FOR REMOVING NITROGEN OXIDES FROM GASES. M. S. Peters. Aug. 31, 1955. 93p. Contract AT(11-1)-276. \$15.30(ph OTS); \$5.40(mf OTS).

The fundamental principles involved in the removal of nitrogen oxides from gases were studied, and experimental tests were conducted to develop improved methods for accomplishing the removal operation. The important factor in determining the rate of removal of NO_2 and N_2O_4 from gases was found to be the rate of the chemical reactions involved in the removal process. The roles of gas-phase and liquid-phase reactions, as well as mist formation, were investigated, and the results were interpreted on the basis of chemical reaction rates as the controlling mechanism. The information from the fundamental studies was applied to a study of improved methods for removing nitrogen oxides from gases. Experimental tests were conducted with bubble-cap towers, packed towers, fritted bubblers, Venturi atomizers, wetted-wall towers, and spray towers. Water, silica gel, and aqueous solutions of NaOH , NaCl , and HNO_3 were examined as the removal media. Venturi atomizers were found to be very inefficient for removing nitrogen oxides from gases, while fritted bubblers and silica-gel adsorbers were the most efficient of the various types of equipment tested. (auth)

3293 KAPL-1453

Knolls Atomic Power Lab., Schenectady, N. Y. CALCIUM PURIFICATION OF NOBLE GASES. C. F. Pachucki and L. R. Yetter. Dec. 1, 1955. 17p. Contract W-31-109-Eng-52. \$0.20(OTS).

Calcium metal at 650 to 700°C is used in conjunction

with a cycling technique to purify noble gases, thereby effecting more accurate mass spectrometric analyses. Gases used consisted of mixtures of inert gases and CH_4 , NH_3 , N_2 , CO , CO_2 , N_2O , and SO_2 . A total removal of 99.9% of reactive gases was accomplished. The distribution of inert gases in air has been determined by this method. (auth)

INSTRUMENTS

3294 AEC-tr-2402

PNEUMATIC TESTING PROCESS: A VERSATILE AID FOR PRECISION MEASURING TECHNIQUE. Max Raum. Translated from Z. tech. Phys. 24, 46-53(1943). 20p.

The physical fundamentals for the direct application of air flow for measuring purposes are presented and the elements of the process are developed. (auth)

ISOTOPES

3295 AECU-3165

Arkansas. Univ., Fayetteville. Coll. of Arts and Sciences. SEARCH FOR NEW RADIOACTIVE NUCLIDES IN THE REGION OF 126 NEUTRONS (thesis). George William Warren. 1956. 53p. Contracts [AT-(40-1)-277 and NSF-G-1877].

A search for the unreported nuclides Hg^{206} , Pt^{202} , Pt^{200} , Au^{202} and Tl^{206m} has been conducted. Under the conditions of these experiments, Hg^{206} would have been found in spent radon seeds if the alpha branching ratio of Pb^{210} were greater than $(6 \pm 1) \times 10^{-6}$ per disintegration. This limit was established by: (1) failure to detect 100 disintegrations min^{-1} of Hg^{206} from 3 mc of RaDEF after a 14 hour separation procedure and (2) assuming that the half-life of $\text{Hg}^{206} > 1$ day but < 2 years. No anomalous Pt, Au or Tl activities were found. A search for Hg^{206} produced by a second-order neutron-capture in a high-flux neutron irradiation of Hg metal enriched in Hg^{204} gave an upper limit of $\sigma_2 \lambda_2 \leq 330$ b hours^{-1} where σ_2 is the neutron absorption cross section for Hg^{206} ($5 < \sigma_2 < 5000$ b) and λ_2 is the decay constant of Hg^{206} , assuming that either a 10-hour or one-year activity could have been detected in the 60-hour gross decay curve begun 60 hours after end of irradiation and followed for one year. The beta decay daughter, i.e., Tl^{206} was not found. The search for Pt^{200} , produced by a second-order neutron-capture in a pile irradiation of "specpure" Pt metal, showed no long-lived Pt activities. The 82-day Pt activity previously reported in the literature was shown to be Ir^{192} , produced by activation of subspectroscopic amounts of Ir impurity. The alpha branching ratio of Bi^{210} has been re-determined by separating 4 min Tl^{206} quantitatively from 3 mc of an equilibrium mixture of RaDEF and found to be $(1.7 \pm 0.2) \times 10^{-6}$ per disintegration. The technique of cellulose column chromatography has been used to obtain quantitative separations of Hg, Pt, Au, and Tl from RaDEF, Au from Pt and Pt from Ir. A new method of ascending paper chromatography has been developed which produces clean, quantitative separations of some cations from macro concentrations of other cations in from 2 to 20 min. Formerly, paper chromatographic techniques required 10 to 24 hours. (auth)

Refer also to abstract 3266.

ISOTOPE SEPARATION

3296 AEC-tr-2393

[PERUVIAN CHEMIST SEPARATES U^{235} FROM U^{238} . Report of work of Angel Grayson Fossa.] Translated from *La Cronica* (1955) Aug. 25-26. 5p.

Uranium isotopes U^{235} have been separated from U^{238} by flotation techniques utilizing mass differences, molecular forces, and osmotic pressures. The uranium solutions were converted to uranous uranic oxides, which were subsequently reduced to metallic U by reaction with Zn at high temperature. (News report.) (C.W.H.)

3297 AEC-tr-2415

THE SEPARATING NOZZLE. A NEW APPARATUS FOR THE SEPARATION OF GASES AND ISOTOPES. E. W. Becker, K. Bier, and H. Burghoff. Translated from *Z. Naturforsch.* 10a, 565-72(1955). Available from Lawyers & Merchants Translation Bureau, New York.

Upon the flow of a mixture of gases or isotopes out of a nozzle, there occurs, under suitable pressure conditions a partial spatial separation of the components which can be utilized for the recovery of the components by the provision of a skimming diaphragm. The properties of the combination of nozzle and skimming diaphragm, which is given the name "skimming nozzle" are determined with various mixtures of gases and isotopes and discussed with respect to the separation of isotopes in practical work. The separation factors which can be obtained between the gas streams agree approximately with those of a Hertz porous-barrier unit. The replacement of the fine pore barriers by separating nozzles leads however to considerably greater dependability in operation and permits of a substantially higher flow of gas with the same expenditure for the separating elements. (auth)

MATHEMATICS

3298 AECU-3157

California Inst. of Tech., Pasadena. Norman Bridge Lab. of Physics.

DATATRON DIGITAL COMPUTER PROGRAM FOR LEAST-SQUARES ANALYSES OF VARIANCE. Special Technical Report No. 18: John S. Rollett and Thomas W. Layton. July 1955. 65p. Contract AT(04-3)-63. \$10.80 (ph OTS); \$3.90(mf OTS).

A digital computer program for calculating least-squares solutions and making analyses of variance of sets of overdetermined linear equations is described. The entire code is reproduced with sufficient description of the program to enable anyone familiar with the Electrodatta Datatron Computer to use it for similar problems. (D.E.B.)

Refer also to abstract 3317.

MEASURING INSTRUMENTS AND TECHNIQUES

3299 KAPL-1110

Knolls Atomic Power Lab., Schenectady, N. Y. PROPORTIONAL COUNTERS FOR USE WITH NEUTRON VELOCITY SELECTOR. E. B. Fehr, E. C. Palmer, and W. J. McRoberts. Dec. 1, 1955. 19p. Contract W-31-109-Eng-52. \$0.20(OTS).

A BF_3 -filled proportional counter with high counting efficiency and low electron collection time is described. It was designed specifically for use in high resolution transmission measurements with the G. E. betatron velocity selector. (auth)

3300 MLM-1020

Mound Lab., Miamisburg, Ohio.

THE RADIOELECTRIC EFFECT. II. USE OF THE RADIOELECTRIC CELL AS A MEASURING INSTRUMENT. John H. Hutchinson, G. R. Grove, and J. W. Heyd—A. J. Rogers, [ed.]. Dec. 2, 1954. 23p. Contract AT33-1-GEN-53. \$0.25(OTS).

Radiation measuring devices called "radioelectric cells" are used for the gamma assay of samples and solutions, and precisions as good as is attained with any of the other assay procedures now in use are obtained. They rapidly furnish information to the operator, as frequently as is required, and for some specific applications they eliminate the sampling and counting expense. The radioelectric cell may be used for pressure measurements of some gases. Since the quantity of current flowing in the external circuit is dependent upon the type and pressure of the filling gas, it was believed that the radioelectric cell could be used to accurately measure gas pressure. Since the pressure-versus-current curve for all gases is not linear, the use of the radioelectric cell as a pressure gauge has its limitations. (auth)

3301 TID-8006

Technical Information Service, AEC.

GLASS DOSIMETERS FOR RADIATION MEASUREMENT. James H. Schulman, Naval Research Lab. Mar. 1956. 18p. \$0.20(OTS).

One of its monograph series "The Industrial Atom."

The principles and mechanisms involved in radiation detection with special Ag-bearing phosphate glass are discussed. Two detection devices are described which embody the principles of radiophotoluminescence. One is a personnel dosimeter for military and civilian defense use and the other is a dosimeter employing a small polished piece of glass for measuring high doses in food and drug sterilization. Other devices in the process of being developed are discussed briefly. (C.H.)

3302 AEC-tr-2394

ESTIMATION OF ABSORBED RADIATION IN VIVO. Jan Müller and Marie Houšková. Translated from *Pracovní Lekarství* 5, 191-8(1953). 28p.

A method is described which was developed for use in making estimates of absorbed radium in vivo. The method was applied in estimations of radon present in normal laboratory atmosphere, in the atmosphere of the city of Prague, in the breath from a group of normal people, the breath from a radiochemist exposed to radium, and the breath from a group of uranium miners. The findings are discussed. (C.H.)

MESONS

3303 UCRL-3274

California. Univ., Berkeley. Radiation Lab.

TABLES OF K-MESON SCATTERING BY PROTONS. James A. Baker and Kent Curtis. Jan. 31, 1956. 73p. Contract W-7405-eng-48. \$12.30(ph OTS); \$4.50(mf OTS).

Tables are given for the elastic scattering of K mesons

by protons at rest. These facilitate the conversion of the observable quantities in the laboratory system to the center-of-mass system. They cover the range of incident K-meson energies from 10 Mev to 6000 Mev. The data given include those on energy and angles of the incident and scattered particles. (B.J.H.)

3304 UCRL-3291

California. Univ., Berkeley. Radiation Lab.
MASS AND SPIN-PARITY CHARACTER OF THE TAU MESON. Harry H. Heckman, Frances M. Smith, and Walter H. Barkas. Feb. 22, 1956. 15p. Contract W-7405-eng-48. \$0.20(OTS).

Analyses of 41 τ^- and τ'^- meson decay events are presented. Since the emulsion density was accurately known, and an improved range-energy curve is available, a Q-value for the τ decay was obtained, 75.08 ± 0.20 Mev, which is more precise than that previously available.

Analysis to determine the character of the τ meson was made by comparing the experimental data with the 5 spin-parity combinations that lead to unique energy and angular distributions. It is found on employing a χ^2 test that there is a probability of 18% that the χ^2 for the (0, -) choice may exceed that observed, whereas the next most probable choice, (3, -), yields a probability of only 2.8%. The data could not distinguish between the (0, -) and (2, -) states of the τ meson. The τ'/τ ratio observed is 0.25 ± 0.12 , which is consistent with the hypothesis of charge independence. The energy distribution of the π^+ meson in the τ' decay is consistent with a decay scheme $\tau' \rightarrow \pi^+ + 2\pi^0$, and an associated electron pair also confirms this supposed mode of decay. (auth)

3305 UCRL-3295

California. Univ., Berkeley. Radiation Lab.
PRELIMINARY REPORT ON MASSES, DECAY MODES, ABUNDANCES AND ENERGY SPECTRA OF K^+ MESONS. Marian N. Whitehead, Donald H. Stork, James R. Peterson, Donald H. Perkins, and Robert W. Birge. Mar. 1, 1956. 7p. Contract W-7405-eng-48. \$1.80(ph OTS); \$1.80(mf OTS).

The analysis of the data from the large emulsion stack, 95 9-by-17-inch 600- μ pellicles, has been substantially completed. K-particle secondaries whose direction indicated that they would stop in the stack were followed. The secondaries were chosen from 2000 total in the stack. Out of 96 secondaries followed, 24 π^+ 's from $K_{\pi 2}$ decay, and 20 μ^+ 's from $K_{\mu 2}$ decay have been stopped. Another 185 have been identified by "blob" counting at the decay point, of which 42 are common with the above 96. These data allow one to calculate ratios of the various type of K particles and to measure the primary mass of identified K's. The percentages of all K's are given. The spectrum of $K_{\mu 3}$ secondaries and the spectrum from the alternate mode of decay of the τ 's have been corrected for scanning efficiency and the results are shown. For comparison the data of other recent studies is included. The masses of the various types of K mesons have been measured by the primary range-momentum method and by the range of secondaries. Statistical errors only are shown. (auth)

MOLECULAR PROPERTIES

3306 AEC-tr-2405

RELATIONS BETWEEN THE ANHARMONICITY CONSTANTS AND THE FREQUENCIES OF ISOTOPIC MOLE-

CULES. L. M. Sverdlov. Translated from *Doklady Akad. Nauk S.S.S.R.* 94, 451-4(1954). 7p.

NUCLEAR PHYSICS

3307 NAA-SR-1452

Atomics International Div., North American Aviation, Inc., Canoga Park, Calif.

SOLID STATE PHYSICS QUARTERLY PROGRESS REPORT [FOR] APRIL-JUNE 1955. Dwain Bowen, ed. Mar. 15, 1956. 35p. Contract AT-11-1-GEN-8. \$0.30(OTS).

A model of the damage induced in graphite by particle bombardment is briefly discussed. Correlations of neutron flux with radiation damage to graphite are tabulated. The behavior of the electrical resistance, thermal resistance, and thermoelectric power of graphite is shown as a function of neutron irradiation and correlated with proton bombardment data. The thermal annealing of these properties is also shown. Spectra of stored energy release are shown for graphite samples irradiated in the Brookhaven Reactor. The amounts of stored energy release between the irradiation temperature and 0°C show a linear rate of stored energy accumulation of approximately 0.76×10^{-3} cal/gm/Mwh. The resistivity recovery of cold-worked iodide-processed Th wires is given. The effects of radiation on tensile properties of Cu wires are also shown. Nickel foils were irradiated with electrons, and results indicate an energy of 34.5 ± 1.5 ev necessary to displace a Ni atom from its lattice site. Energy bands in face-centered cubic Th were investigated. A new method is suggested for the determination of activation energies and is developed in some detail. (For preceding period see NAA-SR-1367.) (B.J.H.)

3308 UCRL-3294

California. Univ., Berkeley. Radiation Lab.
PHYSICS RESEARCH AT UCRL, 1954-1955. M. Lynn Stevenson and Charlotte E. Mauk. Feb. 10, 1956. 11p. Contract W-7405-eng-48. \$3.30(ph OTS); \$2.40(mf OTS).

A brief review is given of laboratory undertakings in the year ending June 30, 1955. Notable projects include the work leading to identification of the antiproton; new findings on the properties and reactions of elementary particles, on nucleon interactions, and on nuclear properties; and development of new instruments and techniques. (auth)

NUCLEAR PROPERTIES

3309 AECU-3163

Massachusetts Inst. of Tech., Cambridge.
[ECHELLE SPECTROSCOPY]. Seventeenth Quarterly Progress Report. George R. Harrison. Feb. 15, 1956. 9p. Contract AT(30-1)-1283. \$1.80(ph OTS); \$1.80(mf OTS).

Work done on the analysis of the spectrum of Pr I and on the spectrum of Er is summarized. (B.J.H.)

NUCLEAR REACTORS

3310 AECD-3724

Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.

THERMAL NEUTRON FLUX DISTRIBUTION IN THE

HORIZONTAL THROUGH FACILITY IN THE MATERIALS TESTING REACTOR. PART III. G. O. Bright. Jan. 21, 1953. Decl. with deletions Dec. 9, 1955. 17p. Contract AT(10-1)-205. \$0.20(OTS).

Several thermal neutron flux surveys have been made in the HT-1 facility in the MTR. The flux at a reactor power level of 30 Mw has been measured directly for two fuel element configurations: a 5×6 loading. In addition, the flux depression due to the presence of two stages of fuel element has been measured. (auth)

3311 AECU-3031

Brookhaven National Lab., Upton, N. Y.

LECTURES ON ELEMENTARY PILE THEORY. I. Kaplan. 1952. 232p. \$1.25(OTS).

In 1952, the author gave a series of 40 lectures on nuclear physics and pile theory at BNL. Lectures 1 through 20 were compiled and published as, *Nuclear Physics*, Addison-Wesley Publishing Company, Inc., Cambridge, Mass., 1955. Lectures 21 through 40 are compiled in this volume. (D.E.B.)

3312 CF-56-2-79

Oak Ridge National Lab., Tenn.

METHOD OF MIXING BORATED WATER AT THE LID TANK SHIELDING FACILITY. W. J. McCool. Feb. 20, 1956. 5p. Contract [W-7405-eng-26]. \$1.80(ph OTS); \$1.80(mf OTS).

The raw materials used to borate H_2O at the LTSF are boric anhydride and a base. Equations are developed for the determination of the amount of boric anhydride and base to be used for a specific percent of B by weight. (B.J.H.)

3313 NAA-SR-1029

North American Aviation, Inc., Downey, Calif.

REACTOR EVALUATION QUARTERLY PROGRESS REPORT FOR FEBRUARY-APRIL 1954. R. J. Beeley, ed. Sept. 1, 1954. Decl. Nov. 9, 1955. 26p. Contract AT-11-1-GEN-8. \$0.25(OTS).

Progress is reported for Reactor Evaluation Projects for the period February-April, 1954: Results of general reactivity calculations for U-Pu fuel systems in thermal reactors are in publication; differences between these results and those of an ANL study are discussed. Calculations for the natural U-Pu feed-back fuel systems are continuing. Some results are presented for "steady state" conditions in which the concentrations of the various plutonium isotopes in the feed fuel are the same for each fuel pass. The results of a study concerning the effects of neutron flux level on the flux distribution, critical size, and over-all breeding ratio in a Th- U^{233} power breeder are presented. (auth)

3314 NAA-SR-1102

North American Aviation, Inc., Downey, Calif.

REACTOR PHYSICS QUARTERLY PROGRESS REPORT FOR MAY-JULY 1954. Richard A. Laubenstein, ed. Jan. 15, 1955. Decl. Nov. 9, 1955. 28p. Contract AT-11-1-GEN-8. \$0.25(OTS).

The anisotropy in the migration of neutrons has been measured for two additional lattices of U rods in D_2O by comparing the bucklings measured in exponential assemblies with different diameters. Error limitations preclude a definite conclusion, but a small anisotropy appears to exist for the smaller lattice spacings. A determination of the effective neutron age in a U, D_2O lattice has been made by comparing buckling and intra-cell flux distribution

measurements in clean D_2O with similar measurements in borated D_2O . The experimental results give a lower value of age than is calculated by the usual procedures. Detailed theoretical calculations are presented which show that consideration of the effect of absorption of epithermal neutrons will decrease the calculated age and give agreement with experimental results. Measurements on U-rod, D_2O lattices for the exponential experiment program have been completed with work on two additional lattices of slightly enriched uranium. A measurement of the thermal neutron disadvantage factors has been made for a lattice cell which is near the edge of the exponential assembly and the results were found to compare with the usual measurements made on a central cell. Therefore, it is concluded that the usual assumption of a constant thermal utilization over the lattice is valid. (auth)

3315 NAA-SR-1204

North American Aviation, Inc., Downey, Calif.

REACTOR PHYSICS QUARTERLY PROGRESS REPORT FOR AUGUST-OCTOBER 1954. Richard A. Laubenstein, ed. Apr. 1, 1955. Decl. Nov. 9, 1955. 22p. Contract AT-11-1-GEN-8. \$0.20(OTS).

A calculation has been made of the effect of the over-all buckling of an exponential assembly on the excess absorption in the moderator of a rod lattice. In the case of a non-multiplying assembly of neutron absorbing rods in a D_2O moderator, the agreement between calculated and measured excess absorptions is greatly improved by the inclusion of the lattice buckling in the calculations. The average cosine of the angle of neutron scattering in heavy water has been calculated from previous measurements of the transport cross sections for thermal neutrons. This value was found to be in agreement with values calculated from theoretical considerations of the effective deuteron mass in heavy water. An attempt was made to improve the consistency of the theoretical interpretation of the extensive NAA uranium, D_2O lattice data by taking into account the resonance absorption by U^{235} . No detectable correlation was found that would indicate that the effect was significant in the lattices studied. A theoretical study has been made of the effect on the buckling measurements of epithermal neutrons leaking into an exponential assembly. No corrections for this effect were found to be needed in the NAA exponential experiments on multiplying lattices. A reactor has been designed for industrial use as a danger coefficient test facility. The reactor is a water boiler type with provision for testing cylinders up to 2 inches in diameter and slabs up to $\frac{1}{2}$ inch thick by 6 inches wide. It is expected that the sensitivity will be between ± 0.001 and 0.002 cm^2 absorption cross section within 95 per cent confidence limits. As part of an evaluation of the use of a pile oscillator rather than a static danger coefficient test, the effect of frequency of oscillation on the amplitude of the alternating component of the reactor flux has been calculated. (auth)

3316 NAA-SR-1525

Atomics International Div., North American Aviation, Inc., Canoga Park, Calif.

PROGRAM REVIEW OF THE WATER BOILER REACTOR KINETIC EXPERIMENTS. Marlin E. Remley, John W. Flora, David L. Hetrick, and Leo P. Inglis. Mar. 15, 1956. 85p. Contract AT-11-1-GEN-8. \$0.50(OTS).

The experimental facility, apparatus, and research program for kinetic experiments on low power homogeneous reactor cores are described. Theoretical studies in-

clude analogue computations of power vs time and total energy release for various step increases in reactivity. The calculations include the effects of reactivity of radioactive production of gas and of inertial pressure increases during the transients. Analysis of reactor oscillations which permit the determination of heat transfer characteristics, prompt neutron lifetime, and effective fraction of delayed neutrons is given. (C.W.H.)

3317 ORNL-2047

Oak Ridge National Lab., Tenn.

A THREE-REGION, TWO-GROUP, TWO-DIMENSIONAL REACTOR CODE FOR THE ORACLE. C. L. Bradshaw. Mar. 27, 1956. 35p. Contract W-7405-eng-26. \$0.30 (OTS).

The code described has served as an intermediate step to the multi-region, multi-group, two-dimensional reactor calculation. The particular geometry of the code was chosen since there was an immediate need for results from a code of this type. The problem solved is a three-region cylindrical problem using two groups of neutrons. Provision is also made for a thin shell surrounding the core. This shell is considered to be transparent to fast neutrons and an absorber of thermal neutrons. The code can be run with or without the shell and as a two-region problem if so desired. The code has been made as general as possible so that it may be applied to any problem which can be suitably approximated by a two-group three-region cylindrical model. (auth)

3318 TID-7004

Division of Reactor Development, Naval Reactors Branch, AEC.

REACTOR SHIELDING DESIGN MANUAL. Theodore Rockwell, III, ed. Mar. 1956. 478p. \$2.10(OTS).

Included are discussions of basic shielding theory, the bases for setting allowable radiation levels, shielding of the reactor core and cooling system, plant designs and other factors affecting the total shield design, shield engineering, radioactivity problems in the shutdown system, and the effects of shield irregularities and the geometry of radiation sources. Curves and tables of basic data are also given. (B.J.H.)

Refer also to abstract 3248.

PARTICLE ACCELERATORS

Refer to abstract 3322.

RADIATION ABSORPTION AND SCATTERING

3319 BNL-2022

Brookhaven National Lab., Upton, N. Y.

THE TRANSMISSION OF NEUTRONS AND GAMMA-RAYS THROUGH AIR SLOTS. PART IV. THE EFFECT OF AN OFFSET ON THE TRANSMISSION OF NEUTRONS THROUGH AN AIR SLOT IN WATER. Robert D. Schamberger, Ferdinand J. Shore, and Harvey P. Sleeper, Jr. Sept. 1, 1954. Dec. 1, 1955. 20p. Contract AT-30-2-Gen-16. \$0.20(OTS).

For other reports in this series see BNL-2019, 2020, and 2021.

3320 UCRL-3281

California. Univ., Berkeley. Radiation Lab.

EXPERIMENTS ON INTERFERENCE AND POLARIZATION

IN NUCLEON-NUCLEON SCATTERING (thesis). David L. Fischer. Feb. 7, 1956. 63p. Contract W-7405-eng-48. \$10.80(ph OTS); \$3.90(mf OTS).

Experiments have been done to provide additional data on the nucleon-nucleon interaction. The proton-proton cross section was measured for center-of-mass scattering angles between 4.7 and 30.0° at an incident energy of 330 Mev. This includes the angular region where interference effects between Coulomb and nuclear scattering should appear. Nuclear emulsion was used as detector. The rotation parameter R and depolarization parameter D were measured for scattering of protons by neutrons at 310 Mev. The measurement was made by scattering polarized protons from deuterium, and analyzing the resultant polarization of the scattered proton with the neutron counted in coincidence. The proton scattering angle was varied from 20 to 40° (laboratory system). (auth)

Refer also to abstract 3303.

RADIATION EFFECTS

3321 ANL-5472

Argonne National Lab., Lemont, Ill.

NEUTRON-INDUCED DISCOMPOSITION OF GRAPHITE. T. J. Neubert, M. Burton, R. C. Hirt, A. R. VanDyken, M. G. Bowman, J. Royal, W. R. Burns, A. Novick, R. Maurer, and R. Ruder. Jan. 1956. 151p. Contract W-31-109-eng-38. \$0.75(OTS).

Results of the first investigations of the effect of fast neutron bombardment on the physical properties of graphite are described. The experimental work was done during and shortly after the Second World War at the Metallurgical Laboratory of The University of Chicago, the precursor of the Argonne National Laboratory. Texts of the various papers were prepared, for the most part, several years ago and no extensive re-writing has been done. Studies of radiation effects on the elastic modulus, electrical resistivity, thermal conductivity, internal energy, and absorptive properties are included. Paper on annealing are given. (D.E.B.)

3322 NAA-SR-1477

Atomics International Div., North American Aviation, Inc., Canoga Park, Calif.

THE USE OF CYCLOTRON IRRADIATION IN THE STUDY OF RADIATION EFFECTS ON MATERIALS; TECHNIQUES DEVELOPED SINCE 1952. William S. Gilbert and Alan Andrew. Mar. 15, 1956. 16p. Contract AT-11-1-GEN-8. \$0.20(OTS).

Recent developments (since 1952) of techniques for the study of irradiation effects on materials using a cyclotron are described. Details of methods covering both metals and graphite over a temperature range of irradiation from -196° to +500°C are given. Also included are details of an instantaneous cyclotron-beam monitor. (auth)

RADIOACTIVITY

3323 ANL-5523

Argonne National Lab., Lemont, Ill.

BETA GAMMA DIRECTIONAL CORRELATION IN Re^{186} . T. B. Novey, M. S. Freedman, F. T. Porter, and F. Wagner, Jr. Feb. 1956. 25p. Contract W-31-109-eng-38. \$4.80(ph OTS); \$2.70(mf OTS).

The directional correlation between the non-unique first forbidden 934-kev β group and the 137-kev E2 γ transition in the decay of Re^{186} has been measured as a function of β energy above 150 kev. Analysis of the experimental data included a correction which takes into account the effect of the backscattering of electrons from the crystal, for the finite energy resolution of the anthracene crystal scintillation spectrometer. The differential anisotropy increases with increasing β energy to 0.158 ± 0.006 . The directional correlation $W(\theta) = 1 + 0.105 \pm 0.003 \cos^2\theta$ for beta energies of 257 to 934 kev, with no evidence for a $\cos^4\theta$ term, in agreement with theoretical expectation for a first forbidden beta transition. Limited ranges for the ratios of the nuclear matrix elements governing the beta decay were obtained by comparison with theory, assuming the following: the spin and parity sequence (1-, 2+, 0+); the β interaction mixture scalar plus tensor; point nuclear charge. Higher order terms in $2p/\alpha Z$ were included. (auth)

3324 ORNL-1064

Oak Ridge National Lab., Tenn.

RADIOACTIVITY OF DISSOLVER GAS. W. A. Brooksbank and E. J. Fuller. Aug. 26, 1953. Decl. Nov. 22, 1955. 32p. Contract W-7405-Eng-26.

The development at ORNL of a method for measuring β activity in the gases from the dissolving of reactor fuel elements at the Chemical Processing Plant in Idaho is reviewed. This method and apparatus were designed to make dilutions of the original gas sample and thus allow a wide range of activities to be measured, to remove the radioactive iodine and count only radioactive xenon and krypton, and to count the sample at known dilution, temperature, pressure, volume, and geometry. The results of initial tests have been favorable, and it is concluded that the method is ready for subsequent use in Idaho. (auth)

SHIELDING

3325 CF-56-1-94

Oak Ridge National Lab., Tenn.

PHYSICAL PROPERTIES OF BORAL USED IN LID TANK MOCKUPS. J. R. Smolen. Jan. 23, 1956. 3p. Contract [W-7405-eng-26]. \$1.80(ph OTS); \$1.80(mf OTS).

An analysis of Boral used at the LTSF was made for application to shielding calculations. Results indicate an elemental composition of 79 wt. % Al, 15.9 wt. % B, and 4.1 wt. % C. (D.E.B.)

NOTICE

It has been necessary to omit the Author Index and Numerical Index of Reports usually included in this issue. Cumulated indexes for Vol. 10, Nos. 1-12A, will appear in No. 12B, dated June 30, 1956.

